241191

Memorandum

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Subject: Petition for Import Eligibility
1998 Ferrari 456 MGTA 1997 Ferrari 456 GT

Date: April 22, 2003

From: Coleman Sachs
Office of Vehicle Safety Compliance

To: Docket Management

Please place the attached comments in Docket No. NHTSA-2002-12140-6

Attachment

#

G & K AUTOMOTIVE CONVERSION, INC.

3231 S. STANDARD AVE. SANTA ANA, CA 92705-5641
(714) 545-9503 FAX (714) 545-7667

March 14, 2003

Coleman Sachs
Department of Transportation
400 Seventh Street, S.W.
Washington D.C. 20590
Fax (202) 366-1024

Re: Ferrari 1998 456 MGTA and 1997 456 GT petition

Dear Mr. Sachs,

The above-mentioned Petition was submitted on February 14, 2002. Ferrari of North America submitted comments and Mr. Luke Loy requested additional information. We submitted information, and Luke Loy recently sent us a fax regarding questions he still had on three standards, which are:

FMVSS 214 Side Impact
FMVSS 216 Roof
Part 581 Bumpers

Although we feel that these issues were properly addressed in our petition and subsequent correspondence, after more than a year Mr. Luke Loy is still asking for and soliciting information from Ferrari of North America for reasons, which at best, are questionable. The petition cars are substantially similar to the US version sold by Ferrari of North America.

G & K in a good faith effort hired a couple of independent engineers and auto specialist to assist in the process of comparing the US version versus our petitioned vehicles in order to counter all claims raised by Ferrari of North America and hopefully satisfy Mr. Luke Loy's never ending demands for data, views, and arguments. For you review enclosed please find the findings of Mr. Derek Lies, and Andy Harrison.

G & K respectfully requests the review of this report and approval of our petition.

Sincerely,

George Gemayel
G & K Automotive Conversion, Inc.

UNITED STATES DEPARTMENT OF TRANSPORTATION
FEDERAL MOTOR VEHICLE SAFETY STANDARDS
COMPLIANCE RECOMMENDATION FOR
G&K AUTOMOTIVE CONVERSIONS INC., RI

REFFERENCING

FERRARI 1997 456 GT AND 1998 456M GTA

March 13, 2003

Ferrari 456 GT & 456M GTA Compliance Analyses

The following analyses have been conducted to support and document the door beam, roof structure, front and rear bumper construction and installation by G&K Automotive Conversions, Inc., 3231 South Standard Avenue, Santa Ana, California (hereafter referred to as G&K), registered importer. This installation provides structure substantially similar to, and representative of, U.S. standard models of the Ferrari 456 GT and 456M GTA, model years 1997 and 1998 respectively.

Doors – as mandated by US DOT Title 49, Section 571.214

The Ferrari 456 and 456M European Model (hereafter referred to as 456 Euro), use an identical door structure and latch mechanism to the 456 and 456M United States Model (hereafter referred to as 456 US). Therefore we will assume the hinge and latch connections to the frame to be identical. As displayed by factory impact testing of the 456 US, these points adequately disperse load to the frame. However, the 456 Euro does not include the steel door beam found in the 456 US. (image 1 & 2)

Accordingly, G&K has duplicated the USA version door by adding a horizontal structure, positioned by, and welded to, existing factory located mounts, already on the 456 Euro door. This structure is as strong as the like structure in the 456 US, and will be as capable at transferring side impact loads to the fore and aft door faces, and subsequently into the automobile's frame. This can be seen in the accompanying documents. (image 3)

The maximum deflection has been found to adequately satisfy the DOT 571.214 intrusion standard, thus the beam will remain well contained safely within the door envelope.

Calculations

I. BEAM MATERIALS

   A. Beam:
   2 pieces, 1 inch x 1 inch Square Tubing, 0.120" wall, ASTM A500 Grade B, welded along butt

   B. End Plates:
   .125 inch Thick, carbon steel

II. CRUSH LOADS - Per DOT 571.214

   Initial Load – 2250 Lbs Force

   Intermediate Load – 3500 Lbs Force

   Peak Load – 7000 Lbs Force

III. Bending Moment

   A. Bending Moment @ 2250 #, each beam supports a force of 1125 #

SAMPLE CALCULATION:

$$M = \frac{2WA^2}{L^3}(L-A)^2$$

W=1125 #
L= 43 *in*
A=21.5 *in*

$$M = \frac{2(1125\#)(21.5in)^2}{(43in)^3}(43in - 21.5in)^2$$

M=6046.875 *in-#*

B. Bending Moment @ 3500 #, each beam supports a force of 1750 #

M=9271.875 in-#

C. Bending Moment @ 7000 #, each beam supports a force of 3500#

M=18812.5 in-#

IV. Max Deflection

	Initial Load	**Intermediate Load**	**Max Load**
Initial Load **(W)** – each bar	**1125 lb**	**1725 lb**	**3500 lb**
Length of Beam **(L)**	**43 in**		
Length of Outside **(A)**	**1 in**		
Length of Inside **(B)**	**.76 in**		
Moment of Inertia **(I)** (of 1"x1", 0.120" Sq. Tubing)	**.055in^3**		
Extreme Point **(C)**	**.500 in**		
Modulus of Elasticity (Carbon Steel) **(E)**	**29.0 E^6**		
Max Deflection **(Y)**	**0.419in**	**0.422 in**	**0.876 in**
Max Fiber Stress **(σ)**	**219,886 lb/in^2**	**337,159 lb/in^2**	**684,090 lb/in^2**

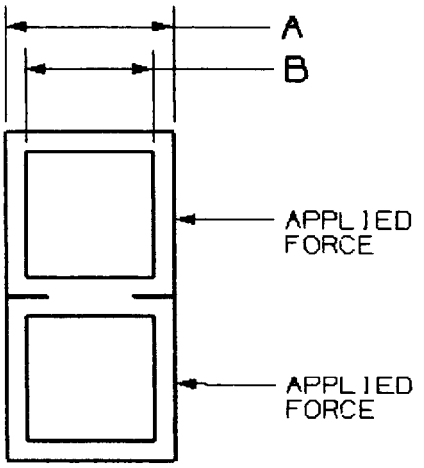
SAMPLE CALCULATION

Max Deflection @ 2250 #, each beam supports a force of 1125 #

$$MaxY = \frac{WL^3}{192(EI)}, \quad I = \frac{A^2 - B^2}{12}$$

$$MaxY = \frac{1125 * 43^3}{192(29E^6 * 0.055)}$$

$$MaxY = 0.419in$$



CROSSECTION OF BEAM CONSISTS OF TWO TUBES WELDED ALONG MATING FACE

V. Max Fiber Stress

Sample Calculation

Max Fiber Stress @ 2250 #, each beam supports a force of 1125 #

$$\sigma = \frac{M}{I/C}$$

$$\sigma = \frac{6046.875}{0.055/.5}$$

$$\sigma = 219886.36$$

Roof – as mandated by US DOT Title 49, Section 571.216

The 456 Euro and the 456 US models have identical roof structures, with the exception of two triangulated braces (gussets) at the rear corners, found in the 456 US. After designing an identical part and bonding it in place, the 456 Euro roof structure has identical or greater structural strength as 456 US. (image 4&5)

The gusset metal part will be fabricated from 4130 sheet metal, 0.040" thick. It will be bonded to the existing frame using Loctite Speedbonder Product H3151. (image 5a)

The test requires that the force applied to the roof structure be (in Newtons) 1.5 times the vehicle curb weight (in Kilograms), times 9.8.

$$F = 1.5 * W * 9.8$$

W= Ferrari 456 GTA Curb Weight = 1768 kg

$$F = 1.5 * 1768 * 9.8$$

$$F=25991.4\ N,\ *(0.2248\ \frac{LB}{N})=5842.8\ LB$$

In the application found in the 456 Euro, the force placed on the gusset will be evenly dispersed over the joint of the "C" pillar, side rail, and rear header rail, a three member joint. The bonding area of the gusset to the frame is approximately 10.5 in^2. (image 5a) Any stress transferred to the gusset during impact testing, will be in tensile.

Adhesive:
Tensile Strength = **3100 psi**
Bonding area = **10.5 in^2**
F Max = 3100 psi • 10.5 in^2 = **32550 lb** (5.57 times test load)

4130 sheet steel:
Tensile Strength = 95 ksi = **95000 psi**
Cross section at corner of gusset = 5.875 in • 0.040 in = **0.235 in^2**
F Max = 95000 psi • 0.235 in^2 = **22325 lb** (3.82 times test load)

The above calculations assume 100% of the test load is transferred to the gusset and adhesive joint. Because of the nature of the car roof design, and that this is a three member connection, it is untrue that 100% of the load will transfer to the gusset. Therefore, given the modification to the 456 Euro prescribed to G&K, the connection will withstand far more impact than applied by the test

Bumpers

It was brought to our attention by Ferrari and DOT, that the front and rear bumpers may be different in the 456 Euro and 456 US. On close physical inspection, it was found that the only differences between the two models are cosmetic. Front and rear marker lights appear on the 456 US, while none are present on the 456 Euro. Also number plate mounts differ slightly. These differences are purely cosmetic, and do not affect the crashworthiness of the 456 Euro. I have prescribed that G&K mount appropriate Ferrari OEM marker lights in the correct positions to make the 456 Euro compliant to DOT regulations (image 6&7). Optionally, the number plate mounts should be changed (image 8 & 9).

Conclusion

It is the recommendation, having made the appropriate modifications to the door, roof, and bumper systems of the 456 Euro, that it should adequately pass US DOT standards, as the 456 US does. The recommendations listed in this document must be followed exactly.

Research Assistant	Engineer
Name: Andrew Harrison	Name: Derek U. Lies
Discipline: Automotive Specialist	Degree: BS Manufacturing Engineering
E-mail: andyuk5557@netscape.net	E-mail:: dlies@socal.rr.com

SIGNED 3/15/03 DATE SIGNED 3/13/03 DATE

Appendix

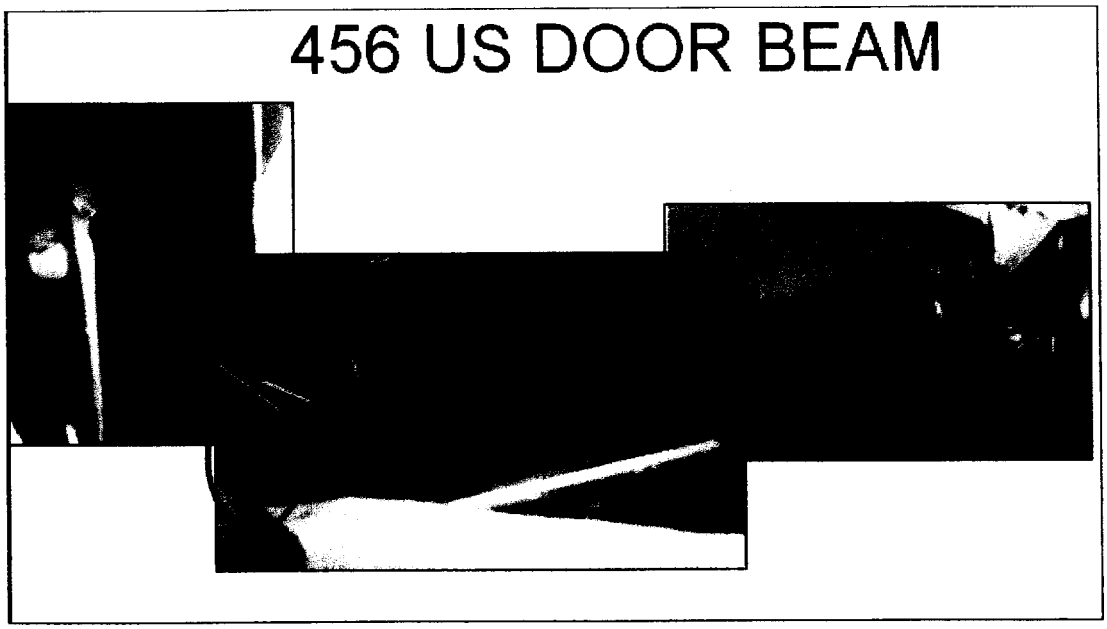


Image 1

Image 2

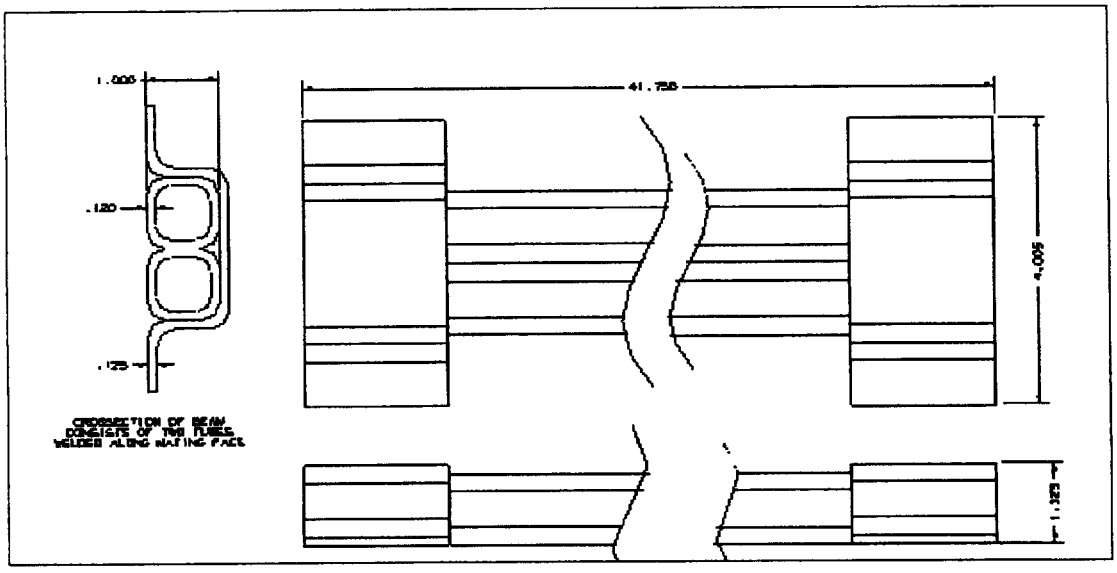


Image 3

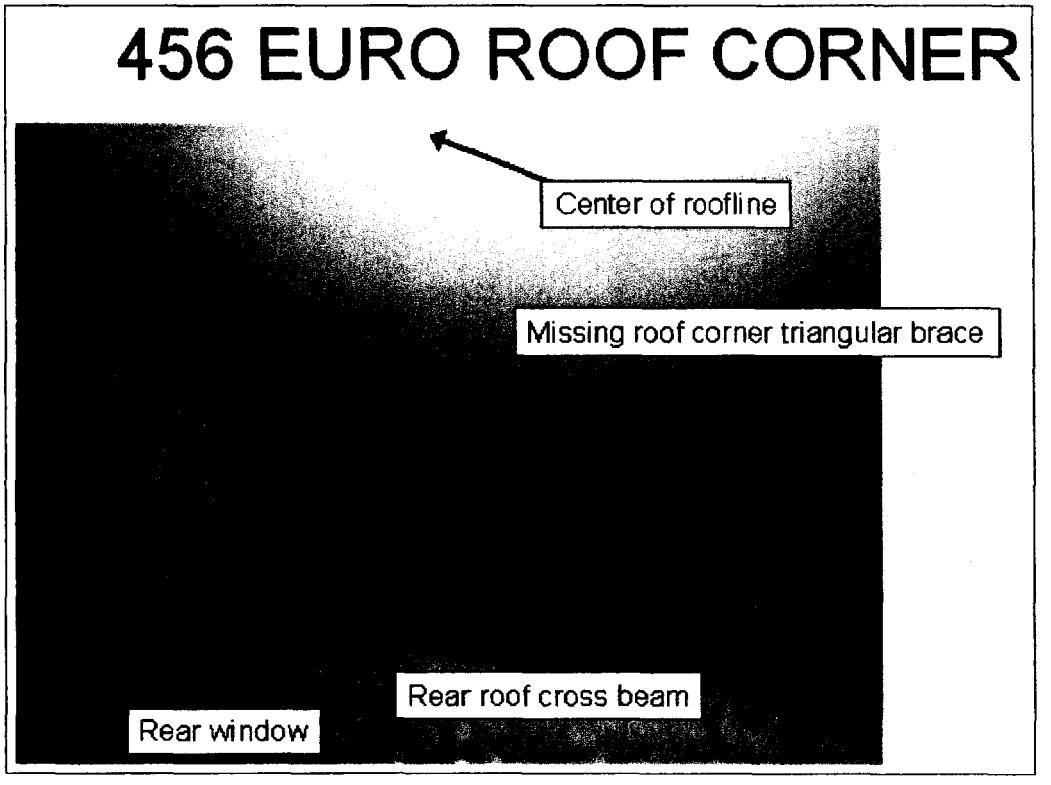
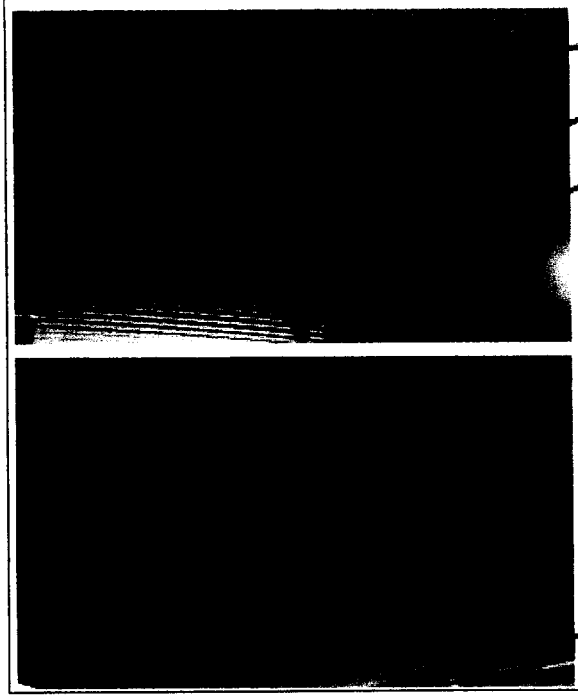

456 EURO ROOF CORNER
Center of roofline
Missing roof corner triangular brace
Rear roof cross beam
Rear window

Image 4

456 US ROOF CORNER



– shows the triangulated roof corner brace, located in the two corners at the rear of the roof

Image 5

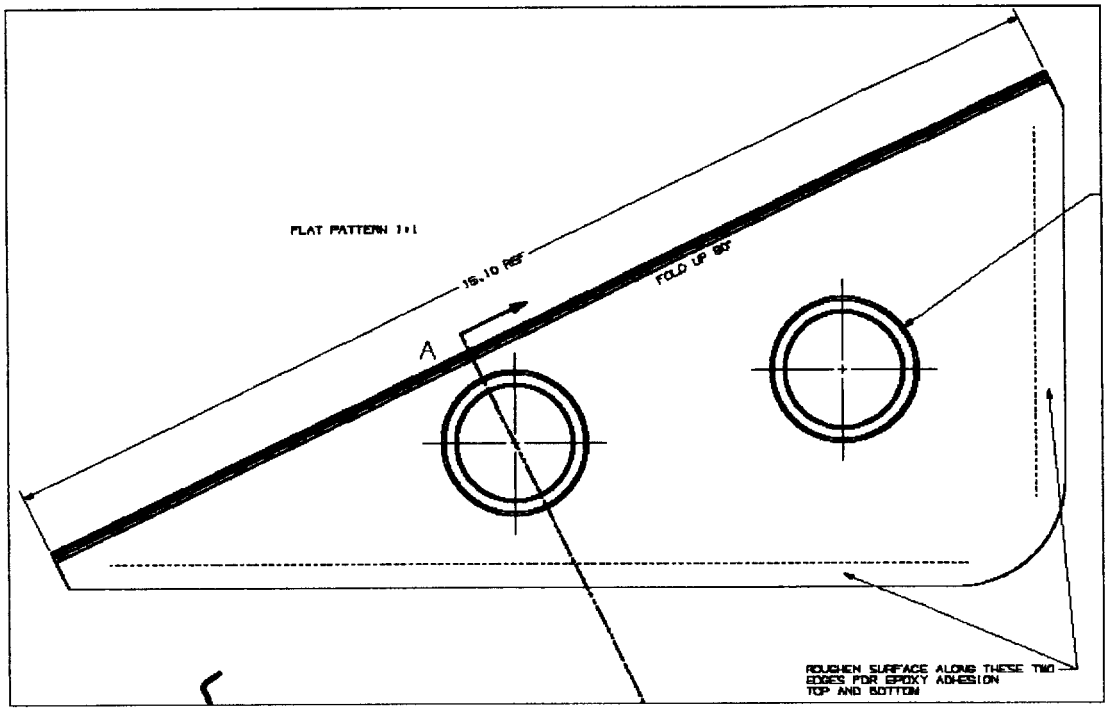


Image 5a

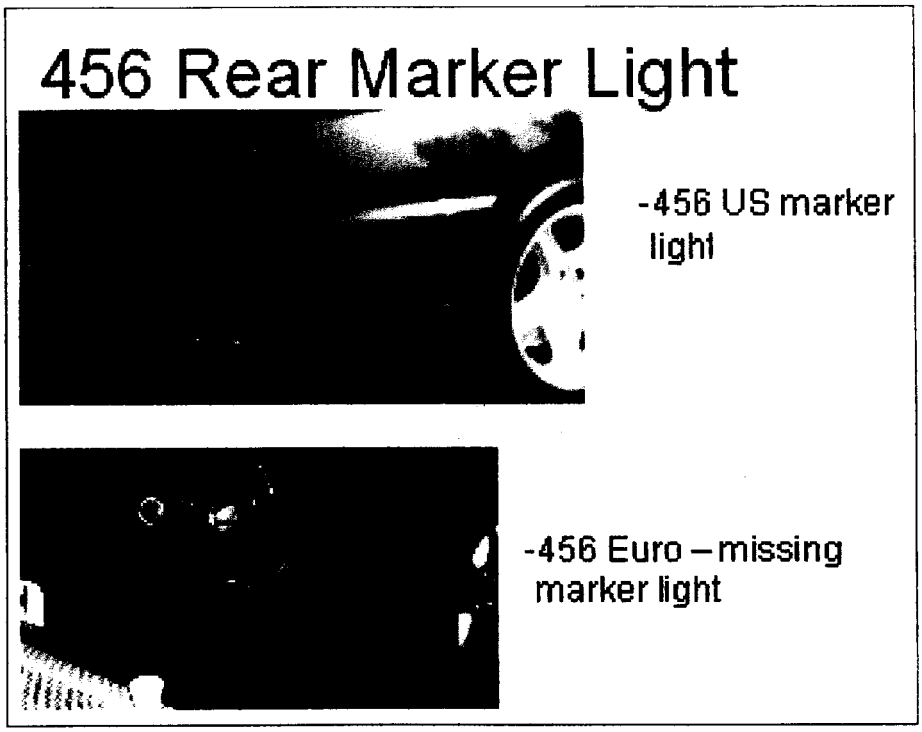


Image 6

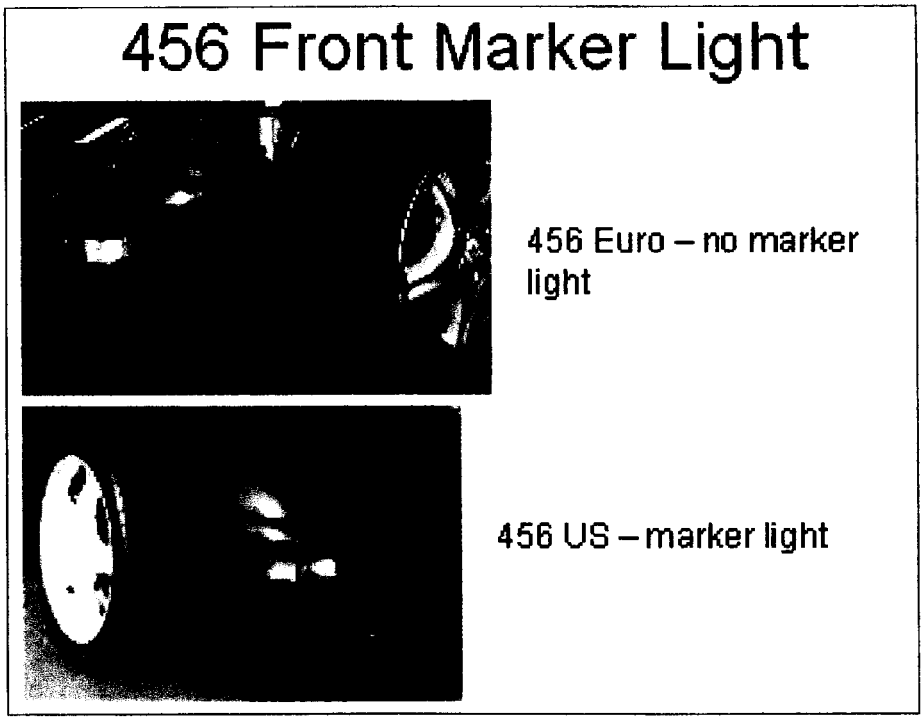
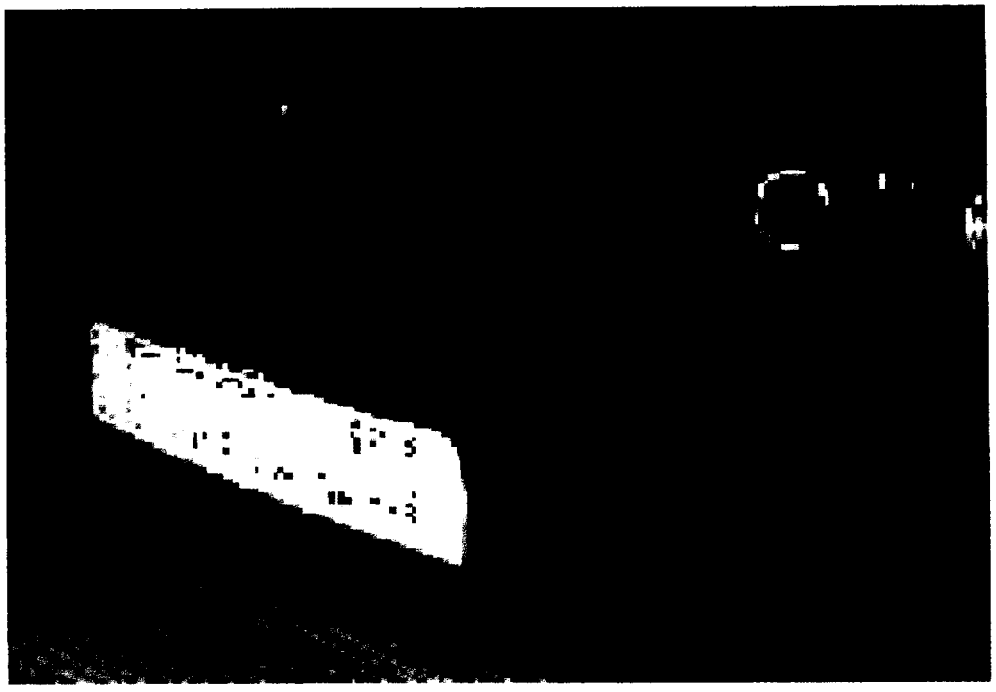


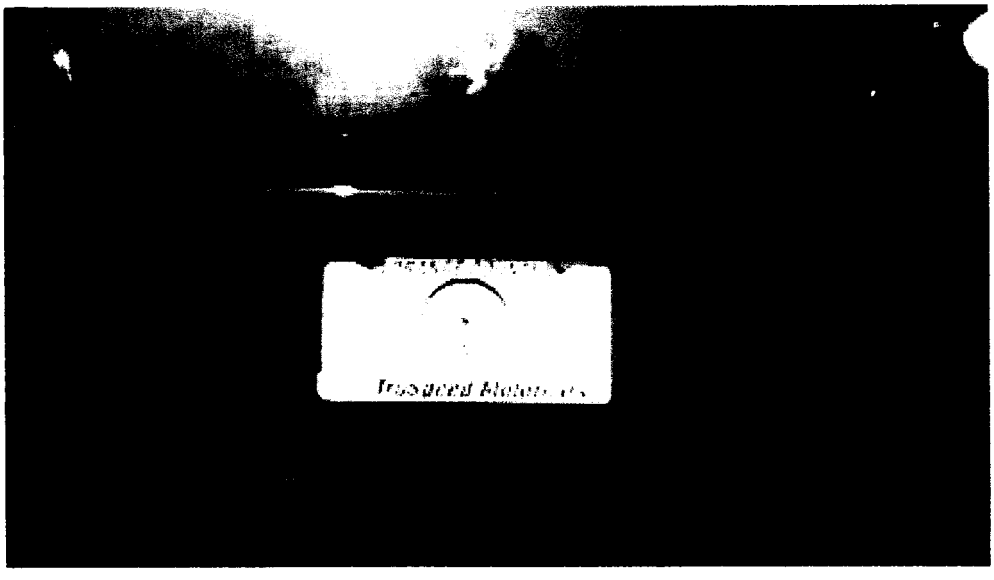
Image 7

456 Rear number plate holder



Euro

Image 8



US

Image 9

Sources:

Loctite Corp, www.loctite.com

American Society for Testing and Materials, www.astm.org

National Archives and Records Administration – Code of Federal Regulations,
www.access.gpo.gov/nara

Engineer's Edge, www.engineersedge.com

National Highway Traffic Safety Administration, www.nhtsa.dot.gov